by graphical integration, m having previously been determined by another graphical integration according to equation (8). The pressures at various depths are plotted in Fig. 5. At the center the pressure is 3.18 millions of megabars, remarkably close to the value obtained from Laplace's law (3.08 million megabars) when the surface density is 2.7.

SUMMARY

For the density and composition of the Earth at various depths there is here proposed a distribution which takes into account the density change due to compression alone. When it is noted that a pressure of 1,000,000 megabars is reached at a depth of less than 2400 km, it is evident that the reduction in volume under such a pressure is a factor not to be neglected. By the use of earthquake data a *quantitative* estimate is given of the density change due to compression of a homogeneous material at various depths—or of that part of the density change due to compression alone in the case of a variable composition. The present distribution, moreover, reconciles the continuity of the velocity depth curves with the difference in velocity in metallic iron and in basic silicate.

Of the four zones described two are sensibly constant in composition but not of constant density (the central core of nickel-iron and the peridotite shell immediately below the surface layer), and two are of variable composition (the surface layer and the pallasite fringe surrounding the metallic core).

The distribution here suggested is at best a rough approximation, but it seems to be the simplest possible arrangement consistent with the physical, seismologic and astronomic data.

In a paper by Gutenberg (Phys. **24**: 296–9. 1923) which has just come to our attention, there is given a density-depth curve which like ours consists of four parts. By assuming the core to be of constant density 2.3 times that of the next layer (also of constant density), Gutenberg calculates that the density of the "Mantel," extending from 60 km to 1200 km depth, varies from $3\frac{1}{2}$ to $4\frac{3}{4}$. This estimate of the density change in the outer parts of the Earth is strikingly like our estimate obtained directly from compressibility and involving assumptions quite different from those of Gutenberg.

BOTANY.—*Note on plants collected in tropical America.* H. Pittier.

Between October 1887 and the present time, I have collected about 18,000 plants in Mexico, Guatemala, Salvador, Honduras, Costa Rica, Panama, Colombia and Venezuela. These plants have been numbered in two series, and, as the numbers of the one series are

frequently confused with those of the other, a short explanation may be helpful to botanists who have to cite any of them.

The first series was started a few days after my arrival in Costa Rica in October 1887. At that time, I proposed to the Costa Rican Government that it conduct a general survey of the natural products of the country, to be carried on simultaneously with the preparation of a topographic map. The idea was favorably considered and resulted in the organization of the Physico-Geographical Institute of Costa Rica, of which I was director until about 1903, and the decline of which began with my departure for the United States. The Institute as planned was to consist of meteorological, topographical, geological and botanical sections, the first three of which were in my immediate charge. Mr. George K. Cherrie, the well-known American ornithologist and explorer, began his study of tropical birds while connected with both the National Museum and the zoological section of the above-named Institute. The position of botanist was filled by a Swiss, Mr. Ad. Tonduz, who devoted about thirty years of his life to plant collecting in Costa Rica, until his death in the fall of 1921. I myself took an extensive part in the formation of the Costa Rican Herbarium, and from the beginning saw to it that duplicates of the plants were widely distributed between the principal collections of Europe and the United States. I also obtained the collaboration of a large number of plant specialists, whose monographs and enumerations were partly published by the Institute, with the assistance, first of Th. Durand, at the time Director of the Royal Botanical Gardens of Brussels, and later, of the well-known student of the flora of Central America, Captain John Donnell Smith of Baltimore.[1]

Originally it had been intended to distribute these plants through my late friend, the above-mentioned Th. Durand, with whom I had collaborated in the preparation of the *Catalogue de la Flore Vaudoise*, and who certainly succeeded in awakening in me a live interest in the flora of the country in which I had lately established myself. Labels were printed with the heading *Plantae Costaricenses Exsiccatae*, which explains the mention of plants under that designation in some publications. It was soon found, however, that this plan did not work, and after that, the distribution was made directly from San José. New labels were prepared with the heading *Herb. Inst. phys.-geograph. costaric.*, and these were used, not only for the newly collected plants, but also for the whole series, which includes in all about 23,000 num-

[1] See DURAND, TH. et PITTIER, H., *Primitiae Florae Costaricensis* vol. 1, Brussels, 1891–1893; vol. 2 (edited by H. Pittier alone), San José, 1898–1900.

bers. Besides the assistance of Mr. Tonduz, the Institute had the active collaboration of a number of collectors, among whom were the late Prof. Paul Biolley of Neuchâtel, Switzerland, one of the most efficient teachers brought into Costa Rica by the Government of this latter country, Charles Werclé, an erratic but very keen-eyed botanist, C. Brade, etc., and, among the natives, J. J. Cooper, Anastasio Alfaro, Carlos Brenes, Otón Jimenez, and perhaps a few others. The collecting was continued for several years after I left the country, until the ultimate numbering went up, if I am not mistaken, to about 23,000. Of these, I estimate that about a fourth part was collected by me, half by Tonduz, and the rest by our other co-workers. Of course, every label bears the name of the collector, which fact was the origin of a certain confusion which was increased when I started my own series after I went to Washington. This latter series includes, up to the present date, 11053 numbers, and contains plants from every country of continental America, from Central Mexico to Venezuela, the result of about twenty-two years' explorations.

The most complete set of the Costa Rican collection is probably that of the United States National Herbarium in Washington, which, of course, has also all the plants I brought together while in the service of the United States Department of Agriculture, and the most complete set of my Venezuelan collections.

The botanical exploration of Costa Rica revealed that country as an astonishing center of endemic development for a considerable number of genera and families, and furnished also a large quota of new species. The same can be said of certain parts of Panama, such as the high mountains of Chiriqui and the lowlands of Darien, so that the collection of types of the National Herbarium has been, and is still being, considerably increased by the additions proceeding from these countries.

The plants which form both collections have been, as mentioned above, very often designated so as to cause mistakes and confusion. The first series is that of the *Physico-Geographical Institute*, and the only right way of citing the plants belonging to it is by mentioning this fact. For instance, we would have:

Calathea macrosepala K. Schum.—La Verbena de Alajuelita, near San José, 1000 m., in ditches (*Pittier, Inst. Phys.-geogr. cost.* 8832); near Turrialba, 570 m. (*Tonduz, Inst. Phys.-geogr. cost.* 8310), etc.

Mentioning the first specimen as Pittier no. 8832, as it is done in Schumann's monograph of the *Marantaceae*,[2] is misleading, because the

[2] In ENGLER, *Pflanzenreich*, Heft IV, **48**: 84. 1902.

real *Pittier* no. 8832 in my own series is a *Prestonia*. Unless I am mistaken, Tonduz himself started a new series during the short stay, interrupted by his death, in Guatemala. To continue the erroneous system of numbering the collections in the formation in which I participated, would result, in the end, in thousands of such mistakes, and that is why I have thought it convenient to give the above explanations, which should be put into the hands of all botanists who are interested in the flora of Central America and the northern part of South America.

SCIENTIFIC NOTES AND NEWS

The following resolution was adopted by the Board of Managers of the Washington Academy of Sciences at a meeting held October 29, 1923:

Whereas, The work of scientific men has contributed enormously to the welfare of the human race and especially to the people of the United States of America, and

Whereas, The government of the United States has recognized the importance of scientific investigations and research by the creation of many scientific bureaus, and has appropriated large sums of money for carrying on their work which has been most beneficial to the health, industries, and commerce of this country, and

Whereas, Our people should be kept informed promptly and fully of the progress made and results accomplished by the scientific organizations of the government, and

Whereas, The members of the government engaged on scientific activities can only function to the best advantage by having conferences with scientific men of this country not in government service and with such men of other countries, and

Whereas, This contact can only be gotten by attendance at scientific gatherings in this country and abroad; therefore, be it

Resolved, That the Washington Academy of Sciences hereby petition and urge the President, the heads of departments of the federal government, and the Congress of the United States to give the welfare of science in the United States their earnest consideration and assistance; and to provide by law and by appropriation of the necessary money for the attendance of such scientists of the government as heads of departments may designate at scientific congresses, conventions, and meetings in this country; and for the attendance of such scientists of this country, both in the government and in private life, as may be recommended to the Department of State by competent authority and approved by the head of that Department or the official acting for him, as representatives of the United States of America at international scientific congresses, conventions, and meetings. These appropriations would be exceedingly small as compared with the returns from them in great benefits to scientific advance in America and hence to the promotion of the national welfare.

Be it further resolved, That a copy of these resolutions be sent to the President of the United States, the head of each of the executive departments, the President of the Senate, and the Speaker of the House of Representatives, and that they be published in the Journal of the Washington Academy of Sciences.

Dr. R. B. Sosman, of the Geophysical Laboratory, Carnegie Institution of Washington, has been appointed by the National Research Council as American member on the permanent committee for the standardization of physico-chemical symbols of the International Union of Pure and Applied Chemistry. The other members of the committee are: Prof. Ernst Cohen, University of Utrecht, chairman; Prof. Alexander Findlay, University of Aberdeen, and Prof. Charles Marie, Sorbonne.

Dr. Arthur L. Day, Director of the Geophysical Laboratory and Chairman of the Carnegie Institution's Advisory Committee in Seismology, gave the opening lecture of the Franklin Institute series for 1923–24 on October 17, 1923. The subject of the lecture was *Earthquakes and volcanic eruptions.*

Dr. Henry S. Graves, dean of the Yale School of Forestry, formerly chief of the United States Forestry Service, has been elected provost of Yale University.

Arrangements have been made with the Radio Corporation of America for a number of short talks on the Smithsonian Institution and its branches to be broadcasted from Station WRC. The first of these talks, on *The Smithsonian Institution, its history and functions*, was given by Austin H. Clark on October 19. The second, on *The Bureau of American Ethnology; what it is and what it does*, was given by Dr. J. W. Fewkes on October 22. Other subjects are *The Natural History Museum, The Arts and Industries Museum, The Zoological Park, The Astrophysical Observatory*, and *Smithsonian Explorations.* It is estimated by officials of the Radio Corporation that these talks reach an audience of nearly 2,000,000 people, and cover an area 1800 miles in all directions from Washington.

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GEOLOGY.—*The age of the supposed Lower Cretaceous of Alabama.* EDWARD W. BERRY, The Johns Hopkins University.[1]

A considerable area in eastern Alabama, extending from about the latitude of Montgomery eastward into Georgia was mapped in the 80's and 90's of the last century by the Alabama and Georgia geologists as a part of the Tuscaloosa formation of western central Alabama.[2] Stratigraphically the beds in question, which are predominately sands and clays, lie upon the crystallines, and are unconformably overlain by the sediments of the Eutaw formation.

The physical evidence, admittedly inconclusive, led Clark, Stephenson, and the writer, to tentatively regard them as the continuation of the "Hamburg beds" of South Carolina, the "Cape Fear" formation of North Carolina, and the Patuxent formation of Maryland and Virginia. This opinion seemed to be partially confirmed by the discovery (in 1910 by L. W. Stephenson) of poorly preserved plant fossils in a bluff on the Tallapoosa River, near Old Fort Decatur in Macon County, Alabama. These fossils were submitted to the writer, who, although unable to conclusively determine any of the forms, was led by the presence of certain cycadophyte remains, to express the opinion that the deposit was of Lower Cretaceous age. The presence of numbers of dicotyledonous leaves led to the suggestion that these beds were younger than the Patuxent formation and could scarcely be older than the Patapsco formation of the Maryland-Virginia region.

This opinion was quoted in whole or in part by Clark in 1911[3] and by Stephenson in 1912 and 1914.[4] The writer visited Old Fort

[1] Published by permission of the Director of the U. S. Geological Survey.

[2] LANGDON, D. W., Geol. Soc. Amer. Bull. 2: 587–606. 1890; VEATCH, OTTO, Geol. Survey Georgia Bull., no. 18: 82–106. 1909.

[3] CLARK, W. B., Maryland Geol. Survey Lower Cretaceous pp. 96, 97. 1911.

[4] STEPHENSON, L. W., U. S. Geol. Survey prof. paper 71: 606. 1912; *idem.* 81: 11. 1914.

Decatur in the summer of 1911 without, however, any success in obtaining identifiable fossils. No additional attempt at settling the question was made until the summer of 1923 when Stephenson revisited the locality, and collected a small amount of poor material which was submitted to the writer. Although, as just stated, this material was as badly macerated and poorly preserved as previous collections, it contained one form that appears to be certainly identifiable, and several others that it was found possible to name tentatively.

These indicate that the deposit is Upper and not Lower Cretaceous in age, thus confirming the earlier opinion of the Alabama Geological Survey. This conclusion seems important enough to warrant the present note and to justify the appearance in print of the evidence upon which it is based.

The species positively determined represents Araucarian conescales, first discovered in west Greenland, and named *Dammara borealis* by Heer.[5] The Alabama specimens are shown in the accompanying figures 5 and 6. This species has been recorded from a large number of localities in both North America and Europe, but since the various known species of Dammara have very similar conescales too much reliance can not be placed upon specific determination. All of the known fossil species of Dammara are, however, Upper Cretaceous in age. In this country *Dammara borealis* has been recorded from the Raritan, Tuscaloosa, Magothy and Black Creek formations, and since all of these occurrences except the first were identified by the present writer, and thus may be presumed to represent the same species of Dammara, their occurrence at Old Fort Decatur points to an age certainly not older and possibly considerably younger than the Cenomanian stage of the European Upper Cretaceous.

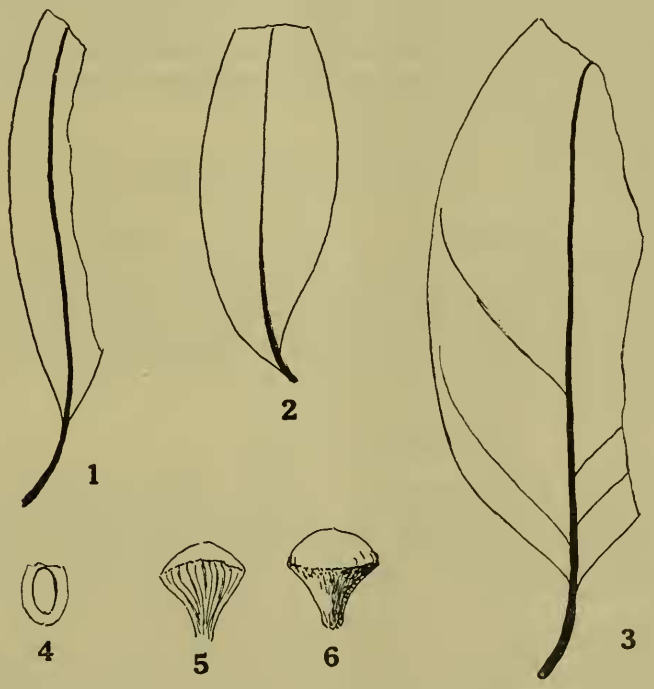
TABLE I

	TUSCALOOSA FORM	RARITAN FORM	DAKOTA SS.	MAGOTHY FORM	BLACK CREEK FORM	ATANE BEDS	PATOOT BEDS	WOODBINE SAND	BINGEN SAND	EUTAW FORM
Cycadinocarpus circularis	X	X			?					
Dammara borealis	X	X		X		X				
Diospyros primaeva	X	X	X	X	X	X	X	X		
Inga cretacea	X		X							
Salix flexuosa	X	X	X	X	X				X	X

[5] Heer, O., Fl. Foss. Arct., 6: Abt. 2: 54, *pl. 37, fig. 5.* 1882.

As can be seen from the accompanying figures, the balance of the material is very incomplete. The tentative determinations which it has been possible to make are given in the explanation of these figures. The ranges of the species with which the Alabama specimens have been compared may be given briefly in tabular form as follows:

The wide range, and the uncertainty of identification of these forms in the present collection, rob them of any certainty for purposes of precise correlation, but as none of them suggests any late Lower Cretaceous species known to the writer they are entitled to some weight, and as all of them have been found in the known Tuscaloosa formation of Alabama, and as one of the species seems to be positively identified, it would seem that the plant-bearing beds at Old Fort Decatur are of about the age of the Tuscaloosa formation of western central Alabama.



Explanation of Figs. 1–6

1. *Salix flexuosa* Newberry (?). 2. *Inga cf. cretacea* Lesquereux. 3. *Diospyros primaeva* Heer (?). 4. *Cycadinocarpus circularis* Newberry (?). 5, 6. *Dammara borealis* Heer.

BOTANY.—*New species of plants from Salvador. II.*[1] PAUL C. STANDLEY, U. S. National Museum.

In the present paper the notes upon two species of grasses have been furnished by Mrs. Agnes Chase, of the U. S. Department of Agriculture, and the description of a new species of *Piper* by Dr. William Trelease of the University of Illinois.

Paspalum botteri (Fourn.) Chase

Dimorphostachys botteri Fourn. Mex. Pl. **2**: 14. 1886. Based on *Botteri* 118, collected at Orizaba, Mexico. The specimen was examined in the Paris Herbarium. This is the species described as *Paspalum macrophyllum* H. B. K. by Nash.[2] The type of that species, also in the Paris Herbarium, was likewise examined, and is found to belong to a different group, not to that of *P. botteri* and its allies (the genus *Dimorphostachys* of Fournier) in which the first glume is developed in at least one of each pair of spikelets. Chase in Hitchcock's Mexican Grasses[3] misapplied the name *Paspalum planifolium* Fourn. to this species. That species is based on a Virlet specimen (without number) from San Luis Potosí, Mexico, and *Müller* 2062 "in herb. Petrop." The Virlet specimen was examined in the Paris Herbarium and is found to be the same as *P. publiflorum* Rupr. *Müller* 2062 in St. Petersburg Herbarium has not been examined. This collection in the Kew Herbarium is *P. lividum* Trin.

SALVADOR: Volcano of San Salvador *Hitchcock* 8956. San Salvador *Calderón* 944.

Syntherisma fiebrigii (Hack.) Chase

Panicum fiebrigii Hack. Rep. Sp. Nov. Fedde **8**: 46. 1910. Based on *Fiebrig* 5371 and 5375 from northern Paraguay, "in herb. Hassler." These two specimens, named in Hackel's script, were examined in the Hassler collection in the herbarium of the Jardin de Botanique, Geneva.

SALVADOR: San Salvador, *Calderón* 1153.

Piper incanum Trelease, sp. nov.

A shrub, 1.5 or in richer soil 3–5 m. high, nodose; flowering internodes moderately slender and short (4×40 mm.), gray-subtomentose; leaves elliptic or subobovate, acuminate, inequilaterally subcordulate, rather small (5–6×12–14 or as much as 8×16 cm.), pinnately nerved from below the middle, the nerves 5 or 6×2, gradually approximated downward, at length bullulate, somewhat thinly appressed-hispid on both faces and gray beneath; petiole rather short (8×2 mm.) and winged at base, or on the more equilaterally truncate-cordulate lower leaves twice as long and winged to or beyond the middle; spikes opposite the leaves, gray-mucronate, in fruit 3×80 mm.; bracts roundish-subpeltate, gray-ciliate; peduncle gray-hairy, 12 mm. long; berries obconic, glabrous; stigmas 3, sessile.

[1] Published by permission of the Secretary of the Smithsonian Institution. The first paper of this series was published in the present volume of the Journal, pp. 363–369.

[2] N. Amer. Fl. **17**: 179. 1909.

[3] Contr. U. S. Nat. Herb. **17**: 234. 1913.

Type in the herbarium of the University of Illinois, collected at San Salvador, Salvador, by Paul C. Standley (no. 19129).

Cuscatlania Standl., gen. nov.

Slender perennial herbs with branched stems; leaves opposite, those of a pair very unequal, the blades entire; flowers in terminal few-flowered leafy-bracted inflorescences, cymose-paniculate, solitary or in pedunculate clusters of 2 or 3, surrounded by an involucre of 4–8 distinct foliaceous bracts; perianth funnelform, corolla-like, purple-red, the tube elongate, scarcely constricted above the ovary, the limb shallowly 5-lobate; stamens 3, the filaments filiform, slightly exserted, inserted upon the perianth tube at its middle, the anthers didymous; ovary oblong, the style filiform, exserted, the stigma capitate; anthocarp oblong-obovoid, constricted at base and apex, almost equally 10-costate.

Type species, *Cuscatlania vulcanicola* Standl.

In general appearance the present plant closely resembles some of the species of *Allionia* and *Mirabilis*, to which it is no doubt related. In those genera, however, the flowers are surrounded by a calyx-like involucre of united bracts. The insertion of the stamens upon the perianth tube is unique in the family Allioniaceae, so far as I am aware.

Cuscatlania vulcanicola Standl., sp. nov.

An ascending or decumbent herb, the slender branches glabrous below, puberulent or villosulous above; petioles slender, mostly 1–1.5 cm. long, glabrous or sparsely puberulent; leaves of a pair very unequal, the smaller less than half the size of the larger ones; larger leaf blades ovate to oblong-ovate or lance-oblong, 5–12 cm. long, 3–4.5 cm. wide, acuminate or long-acuminate, very unequal at base, on one side rounded, on the other acute or acuminate, slightly fleshy, glabrous or nearly so, with numerous and conspicuous raphids on both surfaces; cymes dense, the bracts numerous, leaf-like, 1–2 cm. long, densely viscid-villosulous, short-petiolate, the branches of the inflorescence also densely viscid-villous; flowers sometimes solitary and often in clusters of 2 or 3, the subtending bracts free to the base, 4 to 8, foliaceous, lanceolate or oblanceolate to oblong-elliptic, 10–15 mm. long, acute or acuminate, narrowed at base into a short petiolule, long-ciliate and viscid-villous; perianth about 3 mm. long, the tube very slender, densely viscid-villous with very short hairs, the throat 3–4 mm. in diameter; fruit about 8 mm. long and 3 mm. in diameter, very sparsely and minutely hirtellous.

Type in the U. S. National Herbarium, no. 1,137,438, collected in a quebrada near the base of the Volcán de San Vicente, Departamento de San Vicente, Salvador, altitude about 500 meters, March, 1922, by Paul C. Standley (no. 21678).

The generic name is derived from Cuscatlán, the ancient name of the region which now forms the Republic of El Salvador.

Capparis stenophylla Standl., sp. nov.

Shrub, 1–1.5 m. high, glabrous throughout; leaves mostly clustered near the ends of the branches; petioles very variable in length, often nearly ob-

solete and frequently as much as 7 cm. long, slender; leaf blades narrowly lanceolate to lance-linear, mostly 17–26 cm. long and 1.5–6 cm. wide, acute to long-attenuate at apex, rounded or subcordate at base, lustrous above and with prominulous venation, paler beneath, the venation very prominent, rather thin; flowers subumbellate, on peduncles 2.5–5 cm. long, the pedicels slender, 6–20 mm. long; sepals imbricate in bud, rounded-ovate, obtuse, 2–3 mm. long; petals white, 12 mm. long or more; immature fruit long-stipitate, cylindric, somewhat torulose.

Type in the U. S. National Herbarium, no. 1,137,442, collected in a quebrada near San Vicente, Salvador, altitude about 500 meters, March, 1922, by Paul C. Standley (no. 21681). The following additional specimens have been examined.

SALVADOR: Sonsonate, alt. 220 meters, *Standley* 22330. Sierra de Apaneca, near Finca Colima, Departamento de Ahuachapán, *Standley* 20121.

NICARAGUA: Without definite locality, *Wright*.

Capparis stenophylla may be no more than a narrow-leaved form of *C. baducca* L., a common species of Central America, but the leaves are of so distinctive a form that it seems probable that the Salvadorean shrub merits specific rank.

Sedum salvadorense Standl., sp. nov.

Plants perennial, the stems suffrutescent, about 14 cm. high and 6 mm. thick, granular-papillose above; leaves rather few, alternate, narrowly spatulate-oblanceolate, 2–9 cm. long, 0.5–2 cm. wide, obtuse or rounded at apex, narrowed below into a broad petiole, flat, thin and flaccid, green, the young ones granular-papillose; inflorescence a dense few-flowered cyme about 2 cm. broad, the bracts small, linear or oblanceolate, papillose, the pedicels slender, 2–3 mm. long; sepals linear-oblong, 4–4.5 mm. long, narrowed to a blunt apex; petals white, oblong-ovate, equaling the sepals, cuspidate-acute.

Type in the U. S. National Herbarium, no. 1,136,003, collected on a rock in forest, Finca Colima, Sierra de Apaneca, Departamento de Ahuachapán, Salvador, January, 1922, by Paul C. Standley (no. 20143).

Only a single colony of the plants was found, and the plants were somewhat withered as the result of the long dry season. In spite of their unsatisfactory condition, the specimens seem to represent a species clearly distinct from any heretofore reported from Central America or from Mexico.

Prunus axitliana Standl., sp. nov.

Shrub or tree, 3–7.5 m. high, glabrous throughout, the crown broad and rounded, the young branchlets bright red; petioles slender, 7–11 mm. long, bright red; leaf blades ovate or elliptic-ovate, 5.5–11 cm. long, 2.5–5 cm. wide, obtusely acute or acuminate, rounded to subacute at base, very lustrous on the upper surface, the costa depressed, paler and dull beneath, the slender costa salient, two small round glands present on the lower surface of the blade about 3 mm. above the base; fruiting racemes solitary on young branchlets of the year, stout, about 4 cm. long, few-fruited, the pedicels stout, 6 mm. long; calyx deciduous; fruit subglobose, 10–12 mm. in diameter.

Type in the U. S. National Herbarium, no. 1,152,610, collected on hills near Santa Tecla, Salvador, March, 1923, by Dr. Salvador Calderón (no. 1519). The following sterile specimens obtained by the writer in 1922 also belong here:

SALVADOR: Santa Tecla, alt. about 900 m., *Standley* 23011. Volcán de San Vicente, alt. 1500 m., *Standley* 21515.

Prunus axitliana is related to *P. samydoides* Schlecht., a Mexican species, but is distinguished by its solitary racemes and large leaves. Dr. Calderón reports the vernacular name as *cangrejillo*. The specific name commemorates the King or Topilzín Axitl, founder of the Province of Cuscatlán and of the kingdom Hueytlato or Payaquí, now the Republic of El Salvador.

Acacia calderoni Standl., sp. nov.

A shrub, the branches brown, the young ones densely fulvous-pilose, unarmed; stipules linear-subulate, 5–7 mm. long; petioles 1.5–2 cm. long, without glands, the leaf rachis 5–7 cm. long, densely fulvous-pilose; pinnae 6–9 pairs, mostly 3.5–5.5 cm. long; leaflets about 23 pairs, oblong, 4–6 mm. long, 2 mm. wide, very obtuse, densely covered on both sides, especially beneath, with curved yellowish hairs, the venation obsolete on the upper surface, but both costa and lateral nerves prominent beneath; peduncles axillary or forming a terminal raceme, solitary or geminate, 1–1.5 cm. long, densely pilose; flowers racemose, the racemes very dense, 1.5–2 cm. long, about 1.5 cm. in diameter, the pedicels very short; calyx and corolla 2.5 mm. long, densely pilose with short yellowish hairs.

Type in the U. S. National Herbarium, no. 1,151,942, collected on the Cerro de la Olla, on the Guatemalan frontier near Chalchuapa, Salvador, in 1922 by Dr. Salvador Calderón (no. 977).

Closely related to *A. polypodioides* Standl., a species of southern Mexico and Nicaragua, but easily recognized by the elongate racemes, the flowers of *A. polypodioides* being capitate.

Pithecollobium microstachyum Standl., sp. nov.

Tree, 6–7.5 m. high, the young branchlets slender, puberulent or short-pilose; stipular spines stout, brownish, 1.5 cm. long or less; petioles sometimes 4 cm. long but often much shorter, glabrous, or puberulent, bearing at the apex a stout columnar sessile gland; pinnae one pair, the leaflets also one pair, nearly sessile, oblong to oblong-obovate, mostly 3.5–7 cm. long and 1.5–3 cm. wide, but on flowering branches often not over 1 cm. long, rounded or very obtuse at apex, oblique and obtuse or rounded at base, thick, slightly glabrous but ciliate when young, the venation prominently reticulate on both surfaces; flowers dirty white, in slender spikes 1–3 cm. long, these mostly in ample terminal panicles, the rachis pilosulous, the bracts lance-oblong, shorter than the calyx; calyx sessile, about 1 mm. long, acutely dentate, minutely appressed-pubescent; corolla 3 mm. long, minutely sericeous, the lobes oblong-lanceolate, acute; stamen tube not exserted; fruit several-seeded, short-stipitate, curved or coiled, minutely puberulent or glabrate, the valves thin, red or pink, constricted between the seeds; seeds black and shining, 7–8 mm. long and broad, compressed, surrounded at base by a fleshy white aril.

Type in the U. S. National Herbarium, no. 1,136,477, collected in dry

thicket near La Unión, Salvador, near sea level, February, 1922, by Paul C. Standley (no. 20646). The following additional specimens have been collected:

SALVADOR: Acajutla, *Calderón* 1663; *Standley* 21975.
HONDURAS: Amapala, *Standley* 20744.

It is probable that this is the tree reported from the Gulf of Fonseca by Hemsley as *P. oblongum* Benth. The Salvadorean plant is distinguished from that species by its elongate spikes and very small flowers. The vernacular name employed at La Unión is *mongollano*, a name applied also to *P. dulce* (Roxb.) Benth.

Apalatoa choussyana Standl., sp. nov.

Tree, the branchlets and leaves glabrous; bud scales densely brownish-tomentulose; leaflets 6 or 8, oblong or lance-oblong, 3–6.6 cm. long, 1.5–2 cm. wide, acute or short-acuminate, with blunt tip, unequal at base, cuneate on one side, rounded on the other, thick and firm, lustrous above, paler beneath, the costa subimpressed above, prominent beneath, the lateral nerves not conspicuous; petiolules 2 mm. long, the leaf rachis and petioles together 5–8 cm. long; rachis of the inflorescence and peduncle in fruit 5–9 cm. long, glabrous; fruiting pedicels 4–5 mm. long, stout; legume orbicular or rounded-oval, 5–7 cm. long, 4–5.5 cm. wide, thin, with slightly thickened margin, densely and minutely fulvous-tomentulose, conspicuously rugose.

Type in the U. S. National Herbarium, no. 1,152,621, collected on the Finca San Nicolás, Salvador, May, 1923, by Dr. Salvador Calderón (no. 1573).

At the request of Dr. Calderón this species is named in honor of Mr. Felix Choussy, for many years a resident of Salvador and formerly director of the Escuela de Agronomía, of the Salvadorean government, which was located at Izalco. The vernacular name of the tree is said to be *chichipate*.

Only one species of *Apalatoa* has been reported previously from Central America, **A. Acuminata** (Benth.) Standl.,[4] which was collected by one of the collectors who accompanied the British ship *Sulphur* in its voyage along the western coast of tropical America. The type of this species is said to have come from "Central America," and it is probable that it was collected either at Realejo, Nicaragua, or about the Gulf of Fonseca. The writer has seen no specimens of *A. acuminata*, but according to the description, it differs from *A. choussyana* in its large, abruptly acuminate leaflets, which are widest above the middle. **Apalatoa antillana** (Urban) Standl.[5] also is closely related to the Salvadorean tree, but differs in its larger, thinner, and comparatively narrow leaflets.

Cashalia Standl., gen. nov.

Large unarmed trees; leaves odd-pinnate, the leaflets herbaceous; stipules minute, caducous; flowers racemose, the racemes elongate, many-flowered, simple, the bracts and bractlets caducous; calyx tube broadly campanulate,

[4] *Crudia acuminata* Benth. Bot. Voy. Sulph. 89. 1844.
[5] *Crudia antillana* Urban, Symb. Antill. 6: 10. 1909.

the limb 5-lobate, the 3 lower lobes triangular-ovate, subequal, the 2 upper ones similar, united for half their length; petal one, rounded-obovate, narrowed below into a broad claw; stamens 10, free, subhypogynous, the filaments slender but broadened below, glabrous, subequal, the anthers oval, uniform, attached near the base, dehiscent by longitudinal slits; ovary short-stipitate, 2-ovulate, attenuate to a slender curved style, the stigma terminal, minute; fruit ovoid or cylindric, 1 or 2-seeded, turgid and subterete, coriaceous, bivalvate; seeds large, ovoid, exarillate, without endosperm, the cotyledons thick and fleshy, the radicle very short, inflexed.

Type species, *Cashalia cuscatlanica* Standl.,

Cashalia cuscatlanica Standl., sp. nov.

A very large deciduous tree, the young branchlets and petioles densely brown-pilose with stiff spreading hairs; leaves petiolate, the rachis 20–35 cm. long, subterete, brown-pilose; leaflets usually 11 or 13, alternate, the petiolules stout, 2.5–6 mm. long, densely pilose, the blades mostly oblong or lance-oblong, usually broadest below the middle but sometimes broadest toward the apex, acuminate or long-acuminate, broadly rounded or subcordate at base, mostly 9–23 cm. long and 2.5–9 cm. wide, the lower ones smaller, thin, bright green on the upper surface and glabrous, beneath paler, densely pilose with short spreading brownish hairs, the lateral nerves 13–19 pairs, nearly straight, extending quite to the margin, the secondary nerves in age prominent and closely reticulate; rachis of the racemes about 30 cm. long, stout, densely brown-tomentose, the pedicels stout, 2–3 mm. long; calyx about 8 mm. long, densely brown-tomentose, the lobes about equaling the tube, obtuse or subacute, tomentose within; standard about 18 mm. long, the blade 15 mm. broad, rounded at apex, tomentose on the outer surface, glabrous within; stamens about 15 mm. long, the anthers scarcely 1 mm. long; ovary densely brown-pilose, the style nearly glabrous; fruit 6–10 cm. long, subterete, acute at base and apex, covered with a very dense and fine, brown tomentum, the stipe very stout, about 6 mm. long; seeds terete-ovoid, 3–4 cm. long, 2 cm. in diameter, pointed at base, rounded at apex.

Type in the U. S. National Herbarium, no. 1,136,051, collected in mountain forest on the Finca Colima, Sierra de Apaneca, Departamento de Ahuachapán, Salvador, January, 1922, by Paul C. Standley (no. 20197). The following additional collections belong here:

SALVADOR: Comasagua, December, 1922, *Calderón* 1379. Hills near Santa Tecla, July, 1923, *Calderón* 1752.

The genus *Cashalia*, a member of the family Fabaceae, appears to be closely related to *Tounatea* (*Swartzia*), the specimens of the Salvadorean tree bearing some superficial resemblance to the curious Brazilian *Swartzia polycarpa* Ducke. In the genus *Tounatea*, so far as can be learned, the stamens are always numerous. Bentham and Hooker state that the ovules also are numerous, but this is improbable since the various species often have one-seeded fruits. The calyx of *Cashalia* is very different from that of *Tounatea*, and there is nothing to indicate that it is closed in anthesis, as it is in the latter genus.

Cashalia cuscatlanica is perhaps the most abundant and probably the largest tree in the primeval forest of the Finca Colima. At the time of the writer's visit to that region, the trees were in flower and nearly devoid of

leaves. The trees were so large that it was impossible to climb them in order to get specimens, but some of the racemes were found upon the ground and leaf specimens were secured from young plants. Dr. Calderón's specimens from Comasagua are sterile, but recently he was so fortunate as to find ample fruiting material on the hills near Santa Tecla, whose flora is similar to that of the Sierra de Apaneca. Dr. Calderón has forwarded a photograph of the tree from which the fruits came, eivdently a gigantic one, which he states was larger than a ceiba, sufficient indication of its size to those who are acquainted with Central American trees. The seeds were found upon the ground, where they were beginning to germinate, their cotyledons at that time being of a deep but brilliant green.

This tree is well known in Salvador, under the vernacular name of *cashal.* It is said to be an important lumber tree.

Amerimnon cuscatlanicum Standl., sp. nov.

Tree, the branchlets and leaves glabrous; stipules oblong-ovate, 10–12 mm. long, obtuse, soon deciduous; leaves somewhat blackened in drying, the petioles and rachis slender, 20–25 cm. long, the petiolules slender, 2.5–4 mm. long; leaflets 13–17, lance-oblong or the lowest ovate, 6–10 cm. long and 2–2.5 cm. wide, the lower ones smaller, slightly narrowed to the obtuse apex, rounded to subacute at base, thin, bright green above, the venation prominently reticulate, much paler beneath, the venation prominent and finely reticulate; racemes numerous, forming a dense panicle about 8 cm. long on old wood, the bracts similar to the stipules, ciliate, the branches densely brown-pilosulous, the bractlets minute, oblong, densely pilosulous; flowers white, about 16 mm. long; calyx 4–5 mm. long, densely brown-pilosulous, the lobes about equaling the tube, oblong-ovate, obtuse, the carinal lobe much longer and narrower than the others; petals glabrous, the standard short-clawed, the blade suborbicular, 12 mm. long, rounded at base, obscurely retuse at apex, the wings obovate, oblique, rounded at apex, nearly 10 mm. long.

Type in the U. S. National Herbarium, no. 1,152,618, collected at San Salvador, Salvador, in 1923, by Dr. Salvador Calderón (no. 1557). Sterile specimens which probably represent the same species were collected at Comasagua in December, 1922, by Dr. Calderón (no. 1555).

The Salvadorean tree is related to **Amerimnon lineatum** (Pittier) Standl.[6] and **A. retusum** (Hemsl.) Standl.,[7] of Costa Rica and Panama, but differs from both in its perfectly glabrous leaflets, which are also more numerous and narrower. The vernacular name is *funera.* The wood is highly valued for cabinet work and for general construction purposes.

Amerimnon lineatum, described from the Nicoya Peninsula of Costa Rica, also has been collected at San Salvador, where it bears the name of *funera.* Dr. Calderón states that the trees of *A. cuscatlanicum* are leafless during the dry season, but that in the middle of March the young leaves and flowers are produced, the flowers, however, lasting only two or three days. The stipules are conspicuous upon the very young branches, but quickly fall.

[6] *Dalbergia lineata* Pittier, Journ. Washington Acad. Sci. **12:** 63. 1922.

[7] *Dalbergia retusa* Hemsl. Diag. Pl. Mex. 8. 1878.

The specific name is derived from Cuscatlán, the aborginal name of the Valley of San Salvador and of its principal city.

Amerimnon melanocardium (Pittier) Standl.

Dalbergia melanocardium Pittier, Journ. Washington Acad. Sci. **12**: 57. 1922.

The type of this species was collected in the Department of Santa Rosa, Guatemala. It has been recollected recently at Santa Tecla, Salvador, by Dr. Salvador Calderón (no. 1517), who reports the vernacular name as *chapulaltapa*, a name applied in Salvador to several leguminous trees of various genera.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

WASHINGTON ACADEMY OF SCIENCES

176TH MEETING

The 176th meeting of the ACADEMY was held jointly with the Geological Society of Washington, the Biological Society of Washington, and the Botanical Society of Washington in the Auditorium of the Interior Building, the evening of Wednesday, March 14, 1923. The evening was devoted to a symposium upon *The fossil swamp deposit at the Walker Hotel site*, Connecticut Avenue and De Sales Street, Washington, D. C. The program was as follows:

C. K. WENTWORTH. *The geologic relations.* (Read with supplemental remarks by L. W. STEPHENSON.)

E. BROWN, Department of Agriculture. *Seeds and other plant remains.* (Presented by FREDERICK V. COVILLE.)

E. W. BERRY, Johns Hopkins University. *The plant remains and their significance.*

ALBERT MANN, Carnegie Institution. *The remarkable fresh water diatom flora from the swamp deposit, and its significance.*

LAURENCE LA FORGE. *The physiographic relations of the swamp deposit.*

These addresses will be published in full in the JOURNAL of the Washington Academy of Sciences.

177TH MEETING

The 177th meeting of the ACADEMY was held jointly with the Philosophical Society of Washington, the Washington Society of Engineers, and the American Society for Steel Treating, in the Auditorium of the Interior Building, the evening of Saturday, March 31, 1923. Dr. WALTER ROSENHAIN, F. R. S., of the National Physical Laboratory, England, delivered an address entitled, *The structure and constitution of alloys.*

Dr. ROSENHAIN discussed the general theory of the constitution of ferrous and non-ferrous alloys, the construction of constitutional diagrams which represent graphically the transformations that occur in a metal or an alloy on cooling or heating, their interpretation and relation to the physical properties of alloys. Lantern slides of typical constitutional diagrams were shown and discussed. The question of laboratory equipment for the study of the structure and physical properties of alloys was next considered, and many interesting photographs and diagrams were shown of apparatus developed